Assignment – 1
B.Sc. (Hons.) Mathematics – I
Analysis – 1

Max marks: 25 **Time: 1 Hour**

1. **Define homogenous function .State and prove Euler's theorem on homogenous functions.**

(OR)

$$If \quad u = Sin^{-1}\left[\frac{x^{\frac{1}{3}} + y^{\frac{1}{3}}}{x^{\frac{1}{2}} + y^{\frac{1}{2}}}\right]^{\frac{1}{2}}, \ Show\ that,$$

$$x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x\partial y} + y^2\frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{144}\left(13 + \tan^2 u\right)$$

2. **If y =** $log\left(x + \sqrt{1+x^2}\right)$ **; prove that**

$(1 + x^2)y_{n+2} + (2n + 1)x\,y_{n+1} + n^2\,y_n = 0.$

(OR)

If x = tan (logy), prove that

$(1 + x^2)\,y_{n+1} + (2nx - 1)\,y_n + n(n - 1)\,y_{n-1} = 0$

3. **Find all the asymptotes of the curve**

$(y - x)(y - 2x)^2 + (y + 3x)(y - 2x) + 2x + 2y - 1 = 0.$

4. **Find position and nature of the multiple points on the curve** $x^3 + 2x^2 + 2xy - y^2 + 5x - 2y = 0.$

5. **Show that the radius of curvature at a point of the curve**

$x = ae^t$ (Sint – Cost); $y = ae^t$ (Sint + Cost)

is twice the distance of the tangent at the point from the origin.